Planck observations challenge existing dust models

L. Fanciullo¹, G. Aniano¹, V. Guillet¹, F. Boulanger¹, A. Jones¹, N. Ysard¹, M. Köhler¹

¹IAS, UMR8617 du CNRS, Institut d'Astrophysique Spatiale, Université Paris-Sud, bât 121, 91405 Orsay Cedex

The newly available *Planck* data provide a full sky view of the Milky Way in the submillimetre at a resolution of 5 arcmin. These new constraints on the spectral energy distribution (SED) of large ($0.1 \mu m$) dust grains were analyzed using models (Draine+Li 2007, Compiègne+2011 and Jones+2013) which include a distribution of carbonaceous and silicate grains, tailored to reproduce pre-*Planck* observational constraints.

We show that fitting the *mean* dust SED with the Draine & Li model overpredicts the Av, and therefore the dust mass, by a factor ~ 2 , while the Compiègne model, and especially the Jones model, are closer to the data (within 50% and 20%, respectively).

By normalizing the SED to the extinction measured toward 200,000 quasars from SDSS, we provide a family of 8 diffuse ISM SEDs of the dust thermal emission which differ in their temperature and emissivity per unit magnitude extinction. This confirms that the dust emission properties vary in the diffuse ISM, even at the very low column densities probed here (Av < 0.5). By comparing dust in emission (SED) with dust in extinction (Av), this study is exempt of caveats that arise when normalizing the SED by the gas column density as estimated from H I and CO emission.

While the mean SED is reasonably fitted by the Jones model, none of the models (which all assume fixed dust optical properties) can reproduce the variations observed in this family of SEDs.

Références :

[1]Draine & Li,ApJ, 657, 810, 2007

[2]Compiègne etal, A&A, 525, 2011

[3] Jones etal, A&A, 558, 2013